Example of a simple Algorithm for the Construction of Zero-point-energy Converters

Wolfenbüttel, Oktober – 9 – 2010

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Abstract

The fundamental principle of the conversion of zero-point-energy has been explained in [Tur 10]. This enables us to construct zero-point-energy converters systematically. The method of computation for such a construction was presented as dynamic Finite-Element-Method (DFEM), which is a Finite-Element-Algorithm with the supplement of taking the finite speed of propagation of the interacting-fields (responsible for the forces between the partners of interaction) between the components of the zero-point-energy converter into account.

In order to illustrate the development from the fundamental principle to the real DFEM-program, we now present a small example for this computation, including a short source-code as a working performance. This algorithm is explained in detail here, so that everybody can use and further develop it. Finally we analyse a possible zero-point-energy motor with this program, explaining its conditions of operation and its machine power.

1. An uncomplicated setup

This is the very first time that an algorithm for the construction of zero-point-energy converters is presented. Thus, the computer-program was developed as uncomplicated as possible, in order to make it understandable to everybody. For the conversion of zero-point-energy is not something exotic, it is not difficult to find a very simple setup (as a basis for the analysis in our DFEM-algorithm), which can fulfill this task: For the sake of simplicity, we take a one-dimensional example, and it is already sufficient to connect two masses with a helical spring, in order to build up a simple oscillator – nothing more – this is all we need. The only addition we will need is some electrical charge on the bodies No.1 and 2, or some magnets. The arrangement is drawn in figure 1 as it could be seen in every beginner's textbook.
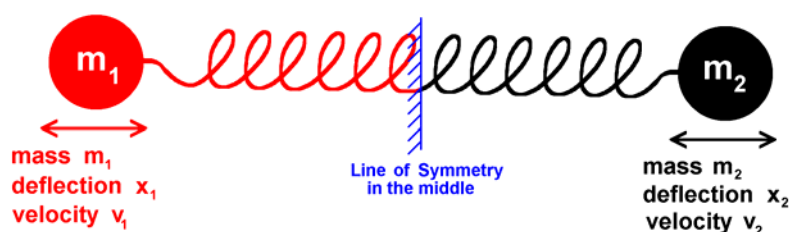

Fig. 1:
Two masses, which are connected by a helical spring, can perform an oscillation.

If we want to trace back the example of figure 1 directly to a simple beginner's example, we can fix one ponderable mass with the use of a helical spring directly to a wall (as drawn in

blue) in the middle of the setup and observe harmonic oscillations according to the differential-equation (1) without friction and without excitation. The solution according to equation (2) is generally known as:

Differential-equation $m \cdot \ddot{x}_1 + D \cdot x_1 = 0$ (resp. $m \cdot \ddot{x}_2 + D \cdot x_2 = 0$)   (1)

Solution $x(t) = A \cdot \cos(\omega t + \varphi_0)$,   (2)

with the symbols as usual in literature.

Of course, the amplitude is constant, and there is no conversion of zero-point-energy in this example.

But if we put some electrical charge on the bodies m_1 and m_2, or if we replace them by two magnets, an additional force will occur (it can be attractive or repulsive), which depends on the distance between the charged spheres or magnets. For the further course of our article, let us chose the direction of this interacting force to be attractive.

In the case of electrically charged spheres, the force follows the (first) coulomb's law according to (3); in the case of permanent magnets the force follows the (second) coulomb's law for dipole-dipole interactions according to (4), see [Ber 71]. Those both laws differ from each other only by the factor of proportionality, and by the fact that in the case of electrical charges, we have to put the charges Q_1, Q_2 into the formula, whereas in the magnetic case, we have to put the magnetic dipole-strengths p_1, p_2 into the formula. In both cases the forces decrease proportional to $1/r^2$. Because of this reason, we can say, that the computation of electrostatic zero-point-energy motors has to be done in complete analogy with the computation of magnetic zero-point-energy motors, because the computations only differ by some constant factors. Nevertheless it has to be emphasized, that a totally different dependency between force and deflection would be absolutely no problem, because it would just require an alteration of two lines in the algorithm of section 3, namely

```
FEL1:=+Q1*Q2/4/pi/epo/r/Abs(r); {electrostatic force between Q1 & Q2}
FEL2:=-Q1*Q2/4/pi/epo/r/Abs(r); {electrostatic force between Q1 & Q2}
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$$F_{\text{charges}} = \frac{1}{4\pi\varepsilon_0} \cdot \frac{Q_1 \cdot Q_2}{r^2}$$ (3)

$$F_{\text{magnets}} = f \cdot \frac{p_1 \cdot p_2}{r^2}$$ (4)

If L_0 is the length of our helical spring in the moment without spring-force, the description of the pendulum is now done by adding an expression for the electrostatic resp. for the magnetic force into the differential-equation of (1), so that we come to the differential equation of (5). The left expression is for body No.1, the right expression for body No.2.

$$m \cdot \ddot{x}_1 + D \cdot x_1 + \frac{C_{EM}}{\left(\frac{L_0}{2} + x_1\right)^2} = 0 \qquad (\text{resp. } m \cdot \ddot{x}_2 + D \cdot x_2 + \frac{C_{EM}}{\left(\frac{L_0}{2} + x_2\right)^2} = 0),$$ (5)

where C_{EM} are the factors of proportionality mentioned above, which contain the information about Q_1, Q_2 or p_1, p_2. Depending on the algebraic sign of the electrical charge Q_1, Q_2, or of the polarity of the dipoles p_1, p_2, the factor C_{EM} can be positive or negative. Besides the inertial forces and the forces of the helical spring, our differential-equation now takes also magnetic forces resp. electric forces into account.

The solution of the differential equation (5) now is not any further a simple sine-expression as it has been in the harmonic oscillation of equation (2). With a numeric iteration, as shown in part 2 of the algorithm in section 3, we derive the solution as seen in figure 2.
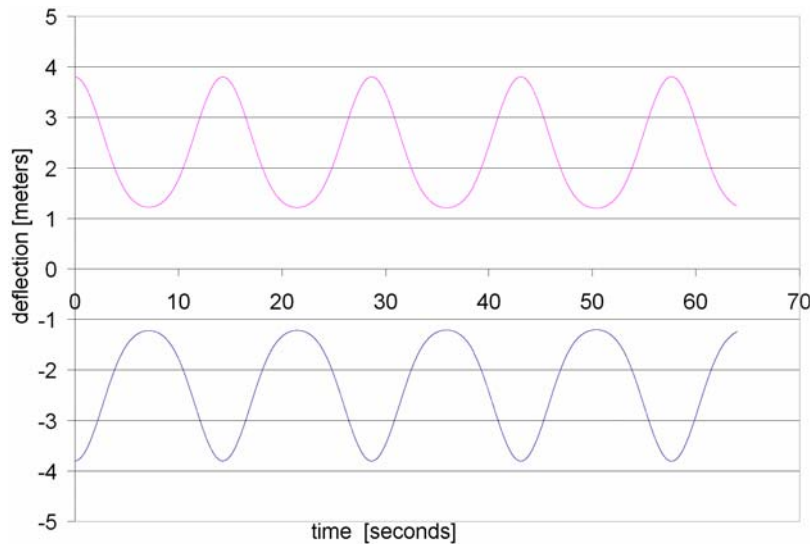
Fig. 2:

Trajectories of the two bodies No.1 and 2, which are electrically charged or permanent magnets. The spring has to be imagined vertically, connecting the bodies No.1 and 2.

Obviously the oscillation is not harmonic.

Obviously classical potential energy (of the electrical or the magnetic field) is converted into the energy of spring energy and kinetic energy. Thus, we have an energy-conversion between these three types of classical energy. Of course zero-point-energy is still not under discussion. The amplitudes are constant, confirming the conservation of classical energy. The computer-simulation of the motion can be found in part 2 in the source-code printed in section 3. Because up to here, we did not yet deal with the zero-point-energy conversion, the algorithm is still a classical static FEM-algorithm (with only two elements).

2. Introducing Dynamics: From FEM to DFEM

We now want to insert the finite speed of propagation of the electric field resp. the magnetic field into the considerations of figure 1 and section 1. In the static theory of electricity, the duration for the propagation of these fields is neglected. This means, that the speed of propagation of the fields is approximated to be infinitely fast. Of course, this is in clear contradiction to the Theory of Relativity, according to which the speed of light is a principle upper limit to all velocity and speed at all. So we regard the static theory of electricity as an approximation, which works rather well in many classical cases for engineering purpose, but which is not sufficient for the explanation of the zero-point-energy motors by principle (see [Tur 10]). Thus we decide to reject this approximation now, in order to make the conversion of zero-point-energy understandable.

By the way, the speed of propagation of the fields is the speed of light only inside the vacuum. In matter, the fields propagate less fast.

Consequently, we have to replace equation (5) and figure 2, which are based on the approximation of infinite speed of propagation of the fields, by a more precise consideration. This is what we do now: For the solution of equation (5), the forces in part 2 of the algorithm (see section 3) had been calculated only with the use of the static version of coulomb's law. For the dynamic computation, we now have to accept the fields of interaction as self-reliant physical entities, and we have to take their finite speed of propagation into account, as illustrated in figure 3. There we see two bodies moving to the left and to the right, and the time-dependant development of the situation is plotted in three steps from the top to the bottom.

At the moment t_a the interacting partner No.1 (magnet or charge) is at the position $x_{1,a}$ and the interacting partner No.2 is at the position $x_{2,a}$. At the moment t_a, No.1 emits a field, which propagates among others also into the direction towards No.2 (red arrow). This part of the field is responsible for force of No.1 acting on No.2. This field(-package) now approaches towards No. 2, but at the same time, No.1 also moves a little bit to the right side, this means, that No.1 follows the direction of the field. But No.2 moves from the right to the left side, this is the direction towards the field(-package). We can see this development, when we follow the course of the time from t_a to t_b. But finally we further follow the course of the time until we reach t_c. This is the moment, at which the field reaches the partner No.2.

For the computation of coulomb's law we now face the question: Which field-strength does partner No.2 feel in this moment ?

The answer is clear: We use Coulomb's law according to equation (3) or (4), and we apply the distance which the field had to pass **really**. This is the distance marked with the blue arrow in figure 3. This means that No.2 feels less field strength in the moment t_c, then it would be derived from the static version of Coulomb's law (for which the distance is marked with a green arrow).

On the other hand, if both partners of interaction would not approach to each other, but run away from each other, the situation would be just the opposite, where No.2 would feel a field, which is a stronger then according to the static version of Coulomb's law. The situation is illustrated in figure 4.
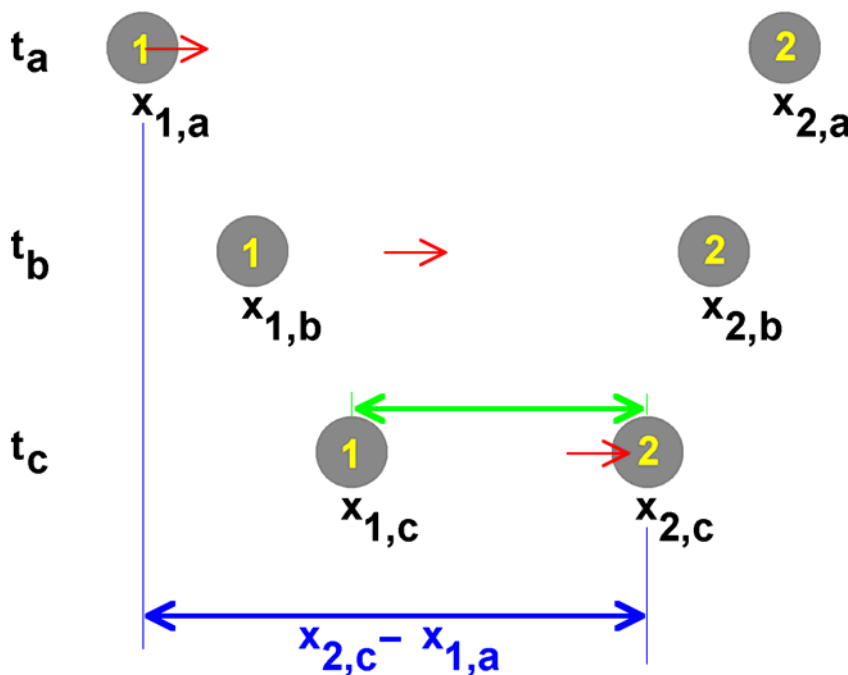

Fig. 3:

Illustration of the influence of the motion of the magnets or the electric charges on the emitted field strength.

Basis of the understanding is the finite speed of propagation of the fields.

The graph displays the situation of two bodies moving away from each other.
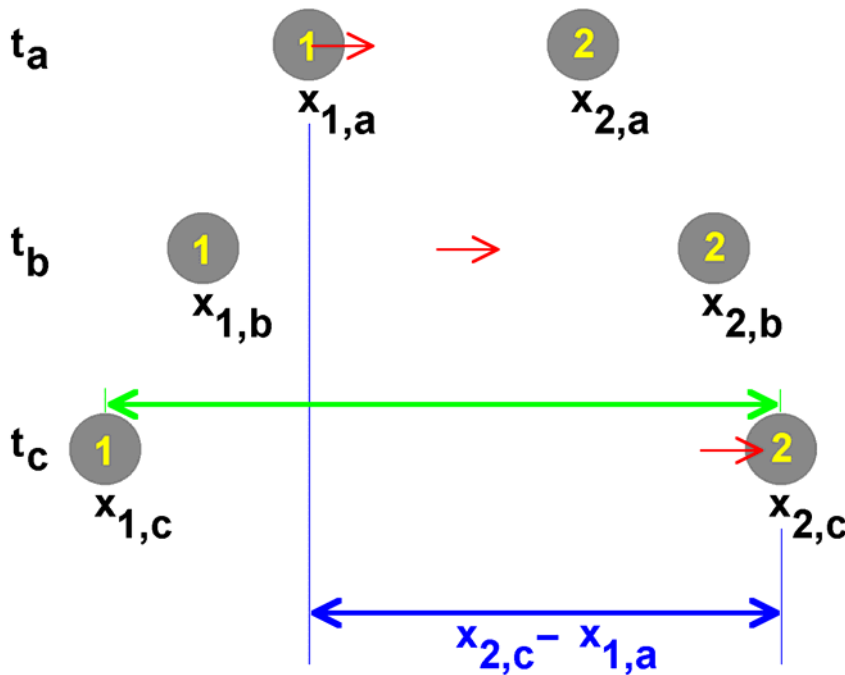
Fig. 4:

Illustration of the influence of the motion of the magnets or the electric charges on the emitted field strength.

Basis of the understanding is the finite speed of propagation of the fields.

The graph displays the situation of two bodies moving towards each other.

If we manage to organize the motion of the bodies (of Fig.1) in a tricky way, we can achieve that they oscillate relatively to each other (due to the helical spring connecting them to each other) in such a way, that they feel a reduced Coulomb-force during the time-intervals when they increase their distance from each other, whereas they feel enhanced Coulomb-force during the time, when they decrease the distance between each other. In the case of attractive Coulomb-forces, these leads to the consequence, that the amplitude of the oscillation increases more and more during time, without any support of classical energy. An illustration can be seen in figure 5, where different colours are used to represent different field strength. In the very first line of figure 5, we see a static field source at rest (charge or magnet), which emits a static field. As long as of the charge is at rest, the field-strength is constant, and thus it is not necessary to perform any dynamic consideration. But if the field source comes into motion, as in the second line of figure 5, the field is reduced on the right side (towards which the field source is moving), as we learned from t_c in Fig.3. The opposite case is a motion of the field source to the left side (third line of figure 5), corresponding to the moment t_c in Fig.4 and causing an enhancement of the field strength on the right side in comparison to the static version of Coulomb's law. Two field sources, which oscillate relatively to each other (this is our setup since figure 1), produce oscillating field strength at the position of each other. This causes, as soon as it is arranged properly, the modulation of the field strength, which leads to the enhancement of the amplitude as described above. Of course this is only possible, because it is supplied with the zero-point-energy of the quantum-vacuum – as explained in [Tur 10].

Of course this is only possible, if the supply with zero-point-energy is kept during many periods of oscillation in good synchronization with the oscillating bodies. In this case, the supply of energy is resonant, and we have an efficient zero-point-energy motor, converting zero-point-energy into classical energy of an oscillation.

In the opposite manner, it is also possible to synchronize the oscillating fields and the oscillating masses with reversed phases to each other, so that the phase of the enhanced field strength always occurs during the time when the attractive partners want to enhance their distance, whereas the phase of reduced field strength always occurs during the time when the attractive partners want to reduce their distance. In this case the dynamics of the fields in

Coulomb's law reduces the oscillation. This means, that classical energy of the oscillation is converted into zero-point-energy of the quantum vacuum.
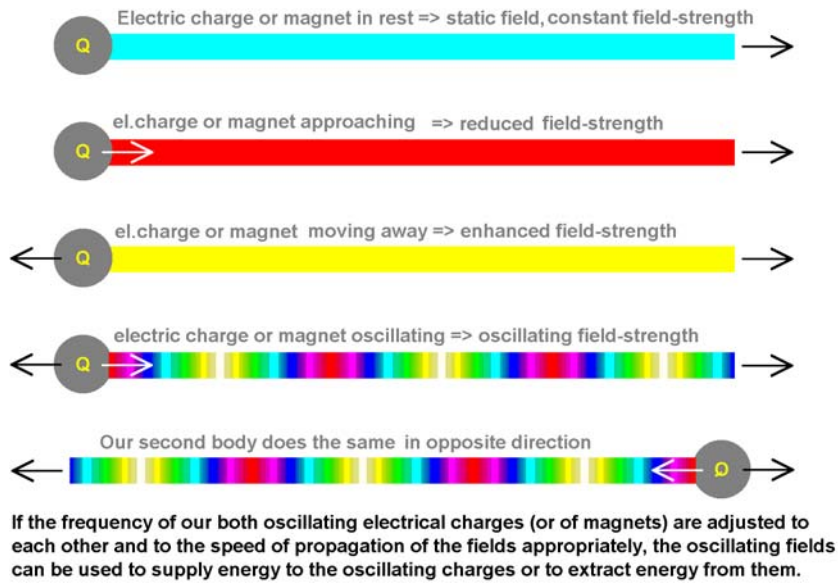

Fig. 5:

Illustration of the oscillating fields, as they are emitted by oscillating electrical charges or by oscillating magnets.

The situation is not surprising, because the Hertz'ian dipole-emitter is known to work according to the same principle.

From there, we understand that the principle of the conversion of zero-point-energy of the quantum-vacuum can be applied in both directions (as soon as we understand it): On the one hand it can be used to convert zero-point-energy into classical energy, and on the other hand it can be used to convert classical energy into zero-point-energy. Which of those both directions is realized in an engine is mainly a question of the adjustment of the system-parameters. Especially the following both system-parameters have to be adjusted appropriately to each other: - the speed of propagation of the fields   and
                           - the speed of motion of the moving field sources.

In our example-algorithm this means, that we have to adjust the deflections and the amplitude of the oscillating bodies, their ponderable masses, Hooke's spring force constant, and finally of course the electrical charges, which supply the Coulomb-forces necessary to convert zero-point-energy appropriately to each other. Instead of electrical charges, it would also be possible to use permanent magnets and to include the adjustment of their dipole-strengths into the adjustment of the system-parameters.

In order to prove all these statements, within the preceding work, a dynamic Finite-element algorithm (DFEM) was developed, which is a very short and easy to understand. It realizes the oscillation of two electrically charged spheres with a spring as drawn in figure 1, taking the finite speed of propagation of the Coulomb-field into account when analyzing the oscillation. This means that we have the same geometrical setup as we had for our static consideration leading to figure 2. But due to the fact, that we now perform a dynamic analysis, we derive the deflections of figure 6, figures 7 and figure 8. Therefore, the adjustment of the system-parameters (in our algorithm) is given as following:

With Fig.6:
-   speed of propagation of the fields $c = 1.4 \frac{m}{s}$
-   electrical charges Q_1 and $Q_2 = 3 \cdot 10^{-5} C$ per each
-   Hooke's spring force constant $D = 2.7 \frac{N}{m}$
-   length of the unloaded helical spring $RLL = 8.0 m$
-   starting-position of the bodies' motion at $x_1 = -3.0 m$ and $x_2 = +3.0 m$.

As can be seen, the amplitude increases rather fast at the begin of the oscillation. Obviously the motion of the bodies and the motion of the Coulomb-fields are adjusted in such a way to each other, that the oscillation gains energy from the quantum vacuum rather efficiently. But we further observe, that there is a certain limit for the amplitudes. This comes from the fact, that the speed of the motion of the bodies reaches a value in comparison with the speed of the propagation of the fields, that it will not be possible to gain more energy from the quantum vacuum than seen in this oscillation after time "30 seconds". This means that the gain of energy from the quantum vacuum is saturated at these system-parameters reached here, and the amplitude will become constant. But it must be said: If we would extract mechanical energy from this oscillation (with constant amplitude), the mechanical extraction of energy would act back on the amplitude (as seen in section 5), but in this moment the re-gain of energy from the quantum vacuum would be enhanced, so that the amplitude would still be kept at its constant value (as long as we do not extract too much mechanical energy). The amount of mechanical energy which we can extract, is the engine-power, which we can gain from the zero-point-energy of the quantum vacuum in this mode of the operation of the zero-point-energy motor.
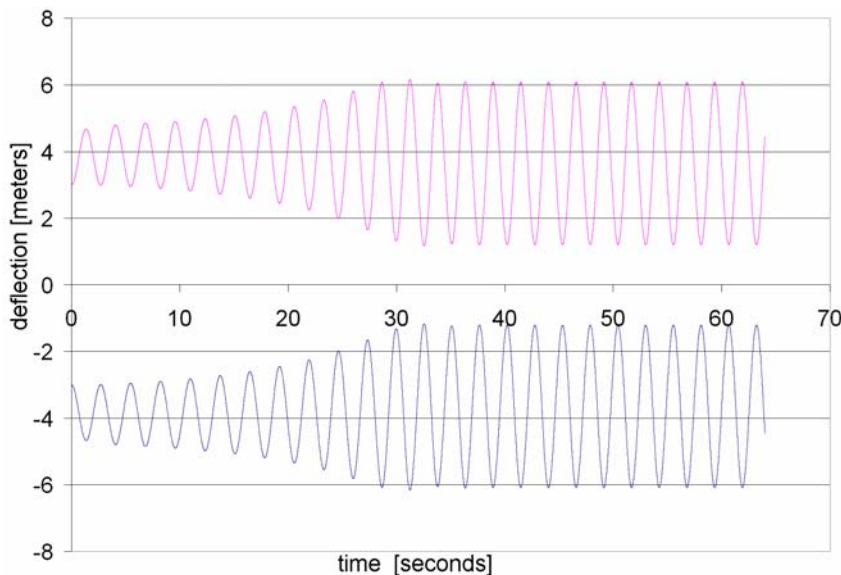

Fig. 6:

Example for the mode of operation of a harmonic oscillator according to figure 1 as a zero-point-energy converter.

We can easily see, that the amplitude is increase-ing due to the gain of zero-point-energy of the quantum vacuum.

With Fig.7:

If the system-parameters are altered only by a small amount, the system behaves completely different. Only a small alteration of the speed of propagation of the fields and of the dimensions of the spring (together with the starting positions of the bodies) in comparison to figure 6 leads to the consequence, that the oscillation can not gain energy from the quantum vacuum, because the speed of the fields and to the speed of the motion of the bodies are not adjusted appropriately to each other:

-   speed of propagation of the fields $c = 1.4 \frac{m}{s}$
-   electrical charges Q_1 and $Q_2 = 3 \cdot 10^{-5} C$ per each.
-   Hooke's spring force constant $D = 2.7 \frac{N}{m}$
-   length of the unloaded helical spring $RLL = 12.0 m$
-   starting-position of the bodies' motion at $x_1 = -5.0 m$ and $x_2 = +5.0 m$.

Under this mode of operation, the engine is not any further a zero-point-energy converter.
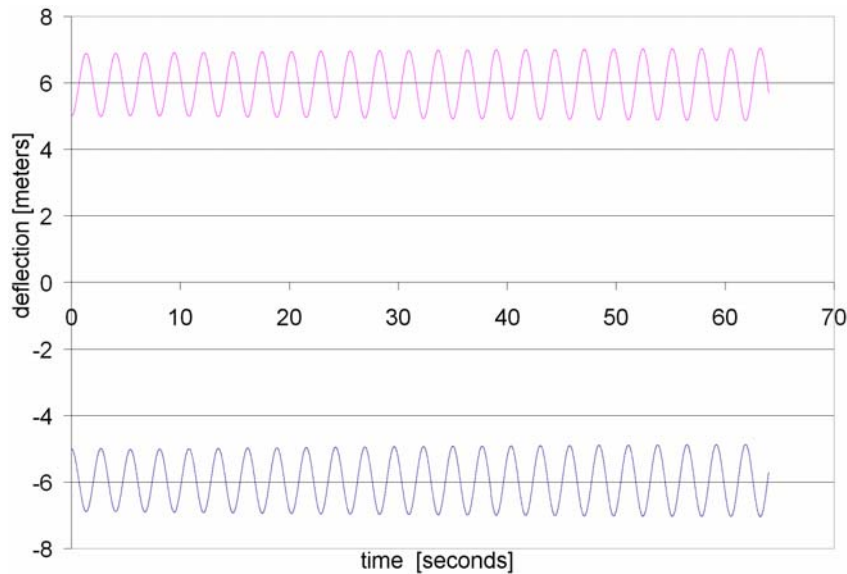
Abb. 7:

Under this mode of operation, the harmonic oscillator according to figure 1 does not gain any energy from the zero-point-oscillations of the quantum vacuum.

With Fig.8:

One tiny further alteration of a system-parameter leads us into the opposite direction, at which the system destroys classical energy by converting it into zero-point-energy. In comparison to figure 6, just only Hooke's spring force constant was altered, nothing else. Nevertheless, the consequence is, that the capability of the system to oscillate was altered in a way, that the duration time for the speed of propagation of the fields work in such way, that they reduce the energy of oscillation of the both bodies. The parameters for this case are:

- speed of propagation of the fields $c = 1.4 \frac{m}{s}$
- electrical charges Q_1 and $Q_2 = 3 \cdot 10^{-5} C$ per each
- Hooke's spring force constant $D = 3.5 \frac{N}{m}$
- length of the unloaded helical spring $RLL = 8.0 m$
- starting-position of the bodies' motion at $x_1 = -3.0 m$ and $x_2 = +3.0 m$.

Under this mode of operation, we have an "inverted" zero-point-energy converter, which produces zero-point-energy instead of utilizing it. This provides us with the knowledge, to handle the zero-point-energy of the quantum vacuum just as we need to do, such as to convert it into classical energy back and forth. We may compare this with the situation of a Stirling-engine in Thermodynamics, which can convert mechanical energy into thermal energy as well as thermal energy into mechanical energy, just depending on the direction into which we make him operate. In similar manner we are now able to adjust zero-point-energy converters just as we like them.
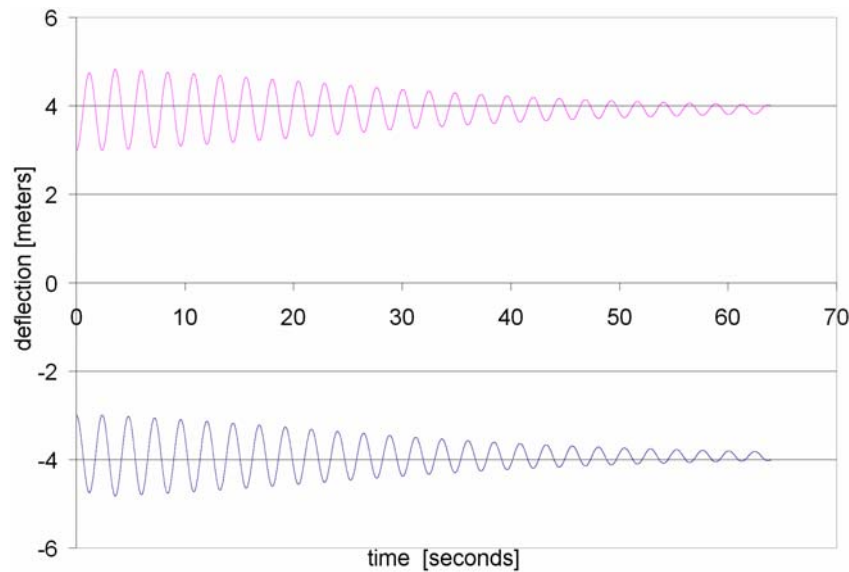
Abb. 8:

Under this mode of operation, the harmonic oscillator according to figure 1 converts mechanical energy into zero-point-energy of the quantum vacuum.

The consequence is an enhancement of the field-strength flowing away from the apparatus.

Remark, regarding the absolute values of the parameters:

These absolute values have been chosen in the way that they are handy, in order to make the article most easy to understand. Of course, in reality the speed of propagation of the fields is much larger than in our little numerical example. We decided to choose such values, because handy figures are easier to fit into the reader's imagination.

The presentation of the DFEM-computer-algorithm in this publication has the sense, to bring everybody who reads this article into the capability to construct his or her zero-point-energy motor. This construction is now possible for every engineer and scientist on the basis of the article presented here. The explanations in [Tur 10] are somehow abstract, so that it became necessary, to support them by a real example-calculation as presented here, giving definite results, which can be used by every technician.

Particularly clear is the answer to the question about the reproducibility of the results presented here: Everybody is invited, to "copy and paste" the DFEM-algorithm as printed in section 3 on his own computer and to run it. All you need is PASCAL-compiler (for instance [Bor 99]). Those who furthermore try the systematic variation of the system-parameters can gain a lot of experience regarding the operation of zero-point-energy converters.

Real zero-point-energy motors, which can be produced and technically applied, are of course more complicated than this simple example presented here. Real zero-point-energy motors rarely consist of only two magnets and one helical spring. But for people with technical training it should not be a principle problem, to expand the algorithm to additional partners of interaction, representing additional components of a machine. The decision to demonstrate a DFEM-program with only two finite elements has the reason, to maximize their understandability. For the same reason, the source-code of the DFEM-algorithm is published below.

3. Source-code of the DFEM-algorithm

```
Program Oszillator_im_DFEM_mit_OVER_UNITY;
{$APPTYPE CONSOLE}
uses
  Windows, Messages, SysUtils, Classes, Graphics, Controls, Forms, Dialogs;

Var epo,muo     : Double;  {Constants of nature}
    c           : Double;  {speed of propagation of the waves and fields}
    D           : Double;  {Hooke's spring force constant}
    m1,m2       : Double;  {Masses of both bodides}
    Q1,Q2       : Double;  {electrical charges of both bodides }
    RLL,FL      : Double;  {relaxed length of the unloaded helical spring}
    r           : Double;  {distance with regard to the finite speed of propagation of the
fields}
    diff,ds,ds1 : Double;  {some variables}
    FK1,FK2     : Double;  {spring forces acting on body No.1 and 2}
    FEL1,FEL2   : Double;  {electrical forces acting on body No.1 and 2}
    delt        : Double;  {time-steps for the motion of the bodies and fields}
    x1,x2,v1,v2 : Array [0..200000] of Real48; {time, position, velocity of the bodies}
    t           : Double;  {variable from the propagation-time of the fields}
    a1,a2       : Double;  {acceleration of the bodies}
    i           : Integer; {counter-variable}
    tj,ts,tr    : Extended;{variable for the determination of the field-propagation-duration
in part 3}
    ianf,iend   : Integer; {begin and end of the time under analysis}
    Abstd       : Integer; {distance of the data-points being plotted}
    Ukp,UkpAlt  : Double;  {for part 3}
    unten,neu   : Boolean; {for part 3}
    AmplAnf,AmplEnd : Double; {for the determination of the enhancement of amplitude}
    Reib    : Double; {force of friction}
    P       : Double; {machine power}
    Pn      : Double; {for the determination of the average value of the machine power}

Procedure Wait;
Var Ki : Char;
begin
  Write('<W>'); Read(Ki); Write(Ki);
  If Ki='e' then Halt;
end;

Procedure Excel_Datenausgabe(Name:String);
Var fout  : Text;     {file to write a results for excel}
    Zahl  : String;
    i,j   : Integer; { counter-variables}
  begin  {data-output for excel:}
  Assign(fout,Name); Rewrite(fout); {open the file}
  For i:=ianf to iend do  {from "plotanf" to "plotend"}
  begin
    If (i mod Abstd)=0 then
    begin
{     the first argument is the time:}
      Str(i*delT:10:5,Zahl);
      For j:=1 to Length(Zahl) do
      begin   {replace decimal-points by commata}
        If Zahl[j]<>'.' then write(fout,Zahl[j]);
        If Zahl[j]='.' then write(fout,',');
      end;
      Write(fout,chr(9));  {Tabulator for data-separation}
{     The first function is the Position of particle No. 1:}
      Str(x1[i]:10:5,Zahl);
      For j:=1 to Length(Zahl) do
      begin   { replace decimal-points by commata }
        If Zahl[j]<>'.' then write(fout,Zahl[j]);
        If Zahl[j]='.' then write(fout,',');
      end;
      Write(fout,chr(9));  {Tabulator for data-separation }
{     second column: Position of body 2:}
      Str(x2[i]:10:5,Zahl);
      For j:=1 to Length(Zahl) do
      begin   { replace decimal-points by commata }
        If Zahl[j]<>'.' then write(fout,Zahl[j]);
        If Zahl[j]='.' then write(fout,',');
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      end;
      Write(fout,chr(9));  {Tabulator for data-separation }
{     third column: velocity of body 1:}
      Str(v1[i]:10:5,Zahl);
      For j:=1 to Length(Zahl) do
      begin   { replace decimal-points by commata }
        If Zahl[j]<>'.' then write(fout,Zahl[j]);
        If Zahl[j]='.' then write(fout,',');
      end;
      Write(fout,chr(9));  {Tabulator for data-separation }
{     fourth column: velocity of body 2:}
      Str(v2[i]:10:5,Zahl);
      For j:=1 to Length(Zahl) do
      begin   { replace decimal-points by commata }
        If Zahl[j]<>'.' then write(fout,Zahl[j]);
        If Zahl[j]='.' then write(fout,',');
      end;
      Writeln(fout,'');    {line-feed for data-separation}
    end;
  end;
  Close(fout);
end;

Begin {Main program}
{ Initialisation: }
  D:=0; r:=0;           {Avoid Delphi-Messages}
  epo:=8.854187817E-12;{As/Vm}  {Magnetic field-constant }
  muo:=4*pi*1E-7;{Vs/Am}        {elektric field-constant }
  c:=Sqrt(1/muo/epo);{m/s}      {speed of light }
  m1:=1;{kg}                    {mass of body 1}
  m2:=1;{kg}                    {mass of body 2}
  delt:=1E-3;{sec.}             {Equidistant time-steps for the calculation of the motion}
  ianf:=0; iend:=100000;        {number of the first and the last time.-step }
  Abstd:=2;             {to plot every Abstd-th data-point}

  Writeln('Oscillator in DFEM with OVER-UNITY:');
  Writeln('epo=',epo:20,';  muo=',muo:20,';  c=',c:20);
  Writeln('m1,m2=',m1:15,', ',m2:15,';  D=',D:15);
  Writeln;

{ Begin of the Main Program}
{ Part 1 had been preparations for the program-development, not interesting any further}

{ Teil 2: Test -> anharmonic oscillation, with electrical charge or magnet: STATIC !}
  For i:=ianf to iend do
  begin
    x1[i]:=0;   x2[i]:=0;  {assign the positions to zero}
    v1[i]:=0;   v2[i]:=0;  {assign the velocities to zero}
  end;
  i:=0; {t:=i*delT;} {time in steps of delt.}
  Q1:=2.01E-5{C};  Q2:=2.01E-5{C}; {electrical charge of both bodies}
  D:=0.20;{N/m}                    {Hooke's spring force constant }
  RLL:=6.0;{m}   {length of the spring without force} {rest-position of the bodies: +/-RLL/2}
  x1[0]:=-3.8;   x2[0]:=+3.8;   {starting-positions of the bodies}
  v1[0]:=00.00;  v2[0]:=00.00;  { starting-velocities of the bodies }
{Now we begin the determination of the motion, step-by-step:}
  Repeat
    i:=i+1;
    FL:=x2[i-1]-x1[i-1]; {length of the spring}
    FK1:=(FL-RLL)*D;  {spring-force, positive pulls to the right side, negative to the left}
    FK2:=(RLL-FL)*D;  {spring-force, positive pulls to the right side, negative to the left}
    FEL1:=0;  FEL2:=0;
    If FL<=1E-20 then
    begin
      Writeln;
      Writeln('Exception: Spring too much compressed in Part 2 at step ',i);
      Excel_Datenausgabe('XLS-Nr-02.DAT');
      Writeln('Data have been stored at "XLS-Nr-02.DAT", then termination of algorithm.');
      Wait; Halt;
    end;
    If FL>1E-20 then
    begin
      FEL1:=+Q1*Q2/4/pi/epo/FL/Abs(FL); {electrostatic force between Q1 & Q2}
      FEL2:=-Q1*Q2/4/pi/epo/FL/Abs(FL); {electrostatic force between Q1 & Q2}
    end;
```

```
{Check:} If i=1 then Writeln('El.-force:  ',FEL1,' and ',FEL2,' Newton');
{Check:} If i=1 then Writeln('Spring-force: ',FK1, ' and ',FK2,' Newton');
   a1:=(FK1+FEL1)/m1;  a2:=(FK2+FEL2)/m2; {acceleration of the bodies}
   v1[i]:=v1[i-1]+a1*delt; {alteration of the speed of body 1}
   v2[i]:=v2[i-1]+a2*delt; {alteration of the speed of body 2}
   x1[i]:=x1[i-1]+v1[i-1]*delt; {alteration of the position of body 1}
   x2[i]:=x2[i-1]+v2[i-1]*delt; {alteration of the position of body 2}
  Until i=iend;
  Excel_Datenausgabe('XLS-Nr-02.DAT'); {position and speed as a function of time}
  Writeln('Part 2 is ready.');

{ Part 3: Test -> Propagation of the fields with finite speed}
  P:=0; Pn:=0; {assign the machine-power to zero}
  For i:=ianf to iend do
  begin
    x1[i]:=0;    x2[i]:=0;  {assign the positions to zero}
    v1[i]:=0;    v2[i]:=0;  {assign the velocities to zero}
  end;
  i:=0;  {counter for the position and velocity}
  c:=1.4; {Sqrt(1/muo/epo);{m/s} {assign the speed of propagation of the fields here}
  Q1:=3E-5{C};  Q2:=3E-5{C};   {electrical charge of the bodies}
  D:=2.7;{N/m}                  { Hooke's spring force constant }
  RLL:=8.0;{m}    {length of the spring without force} {rest-position of the bodies: +/-RLL/2}
  x1[0]:=-3.0;   x2[0]:=+3.0;   {starting-position of the bodies}
  v1[0]:=00.00;  v2[0]:=00.00;  {starting-velocity of the bodies }
  Ukp:=x2[0]; UkpAlt:=Ukp; unten:=true; neu:=true; {first reversal point}
  Writeln('reversal-point: ',Ukp:12:6,' m ');
  {Now we begin the determination of the motion, step-by-step:}
  Repeat
    i:=i+1;
    FL:=x2[i-1]-x1[i-1]; {length of the spring}
    FK1:=(FL-RLL)*D;  {spring-force, positive pulls to the right side, negative to the left}
    FK2:=(RLL-FL)*D;  {spring-force, positive pulls to the right side, negative to the left}
{   determination of the Field-motion-duration, Field-motion-distance, and Field-strength}
    FEL1:=0; FEL2:=0;
    tj:=i; ts:=i; {i mesures the time}
                 {Start the iteration with natural figures:}
{   Writeln('tj=',tj*delt:9:5,' ts=',ts*delt:9:5,'=>',x2[Round(tj)]-x1[Round(ts)]-c*(tj-
ts)*delt:9:5); }
    Repeat
      ts:=ts-1;
      diff:=x2[Round(tj)]-x1[Round(ts)]-c*(tj-ts)*delt;
{     Writeln('tj=',tj*delt:9:5,' ts=',ts*delt:9:5,'=>',diff:9:5); }
    Until ((diff<0)or(ts<=0));
    If diff>=0 then  {before the motion begin at t=0, the bodies have been in rest.}
    begin
      r:=x2[Round(tj)]-x1[0];
{     Writeln('diff>=0; r=',r); }
    end;
    If diff<0 then   {linear interpolation to determine the fraction after the comma}
    begin
{     Writeln('diff<0 ==> tj=',tj,' ts=',ts);
      Write('x2[',Round(tj),']=',x2[Round(tj)]:13:9);
      Write(' und x1[',Round(ts),']=',x1[Round(ts)]:13:9);
      Write(' und x1[',Round(ts+1),']=',x1[Round(ts+1)]:13:9); Writeln; }
      ds:=x2[Round(tj)]-x1[Round(ts)]-c*(tj-ts)*delt;
      ds1:=x2[Round(tj)]-x1[Round(ts+1)]-c*(tj-(ts+1))*delt;
{     Writeln('ds1=',ds1:13:9,' und ds=',ds:13:9); }
      tr:=ts*delt+delt*(-ds)/(ds1-ds); {for linear interpolation}
      tj:=tj*delt;
{     Write('tj=',tj:13:9,' und tr_vor=',tr:13:9); }
      tr:=(tj-tr);  {interpolated moment of field-emission}
      r:=c*tr;           {interpolated real distance}
{     Writeln(' und tr=',tr:13:9,' und r=',r:13:9); }
    end;
    If r<=1E-10 then
    begin
      Writeln;
      Writeln('Exception: Spring too much compressed in Part 3 at step ',i);
      Excel_Datenausgabe('XV-03.DAT');
      Writeln('Data have been stored at "XV-03.DAT", then termination of algorithm.');
      Wait; Halt;
    end;
    If r>1E-10 then {Now insert data into Coulomb's law:}
    begin
```

```
      FEL1:=+Q1*Q2/4/pi/epo/r/Abs(r); {electrostatic force between Q1 & Q2}
      FEL2:=-Q1*Q2/4/pi/epo/r/Abs(r); { electrostatic force between Q1 & Q2}
    end;
    Reib:=0.2;     {friction: computation begins here.}
    If i>=10000 then
    begin
      If FEL1>0 then FEL1:=FEL1-Reib;
      If FEL1<0 then FEL1:=FEL1+Reib;
      If FEL2>0 then FEL2:=FEL2-Reib;
      If FEL2<0 then FEL2:=FEL2+Reib;
      P:=P+Reib*Abs(x1[i]-x1[i-1])/delt;
      Pn:=Pn+1;
    end;             {Friction: computation ends here.}
    {Check:} If i=1 then Writeln('El.-force:  ',FEL1,' and ',FEL2,' Newton');
    {Check:} If i=1 then Writeln('spring-force: ',FK1, ' and ',FK2,' Newton');
    a1:=(FK1+FEL1)/m1;  a2:=(FK2+FEL2)/m2; {acceleration of the bodies}
    v1[i]:=v1[i-1]+a1*delt; {alteration of the speed of body 1}
    v2[i]:=v2[i-1]+a2*delt; {alteration of the speed of body 2}
    x1[i]:=x1[i-1]+v1[i-1]*delt; {alteration of the position of body 1}
    x2[i]:=x2[i-1]+v2[i-1]*delt; {alteration of the position of body 2}
{   If (i mod 1000)=0 then Writeln ('Feldstaerke= ',Q1/4/pi/epo/r/Abs(r),' N/C'); }
{   determination of the reversal-points, for determination of the amplitude's-enhancement:}
    If unten then
    begin
      If x2[i]>Ukp then begin Ukp:=x2[i]; end;
      If x2[i]<Ukp then
      begin
        Writeln('reversal-point: ',Ukp:12:6,' m , amplitude=',Abs(UkpAlt-Ukp));
        If Not(neu) then  AmplEnd:=Abs(UkpAlt-Ukp);
        If neu then begin AmplAnf:=Abs(UkpAlt-Ukp); neu:=false; end;
        unten:=Not(unten); UkpAlt:=Ukp;
      end;
    end;
    If Not(unten) then
    begin
      If x2[i]<Ukp then begin Ukp:=x2[i];  end;
      If x2[i]>Ukp then
      begin
        Writeln('reversal-point: ',Ukp:12:6,' m , amplitude=',Abs(UkpAlt-Ukp));
        If Not(neu) then  AmplEnd:=Abs(UkpAlt-Ukp);
        If neu then begin AmplAnf:=Abs(UkpAlt-Ukp); neu:=false; end;
        unten:=Not(unten); UkpAlt:=Ukp;
      end;
    end;
  Until i=iend;
  Writeln('enhancement of the amplitude: ',AmplEnd-AmplAnf:12:6,' Meter. ');
  Writeln('The machine-power is',P/Pn,' Watt.');
  Excel_Datenausgabe('XV-03.DAT'); {position and speed as a function of time}
  Wait; Wait;
End.
```

4. Background explanation

The conception, showing the way to the DFEM-computation, which is based on the dynamic propagation of the interacting fields, has been discussed in [Tur 10]: According to this conception, the occurrence of electric and magnetic fields can be understood as a reduction of the wavelengths of the zero-point-waves of the quantum vacuum. This reduction of the wavelengths is to be understood as a consequence of the reduction of the speed of propagation of the zero-point-waves due to electric and magnetic fields as one of the consequences of the work of [Hei 36]. If we switch on and off the electric charge suddenly, this would cause gaps between the wave-packets, which are differently emitted during the time when the charge is switched on, or when the charge is switched off. Less sharp than this sudden action of switching on and off, we can understand a continuous motion of the field sources, as explained in figure 3, figure 4 and figure 5. The continuous motion of the field-sources, which we see there, leads to the consequence of a continuous modulation of the field-strength, which goes back to a continuous alteration of the position and velocity of the field-source.

In order to complete the explanations of section 2, we again want to regard the case of a static field-source at rest, as it can be seen in the first line of figure 5. Its field reduces the wave-lengths of the zero-point-waves and it reduces their speed of propagation. Close to the field-source, this effect is much stronger, then more far away from the field source, because the field is the stronger the more close to the field-source. This means, that the zero-point-waves which run away from the field-source and transport the field have to decrease their reduction of the wavelength and the speed of propagation. This has to be done in such a way, that there will not occur any gaps between the waves, because static fields, produced by electric charges in rest do not have any dynamics, but they are continuous. This decrease of the reduction of the wavelength and of the speed of propagation explains the energy dissipating from the field into the quantum vacuum during the propagation of the field. Let us look to the following consideration:

As we know from [Boe 07] for magnetic fields and from [Rik 00], [Rik 03] for electric fields, the reduction of the speed of propagation v of the zero-point-waves is a function of the field strength as following:

$$\left(1-\frac{v}{c}\right)=P_e \cdot \left|\vec{E}\right|^2 \text{ for electric fields} \qquad \text{and} \qquad (6)$$

$$\left(1-\frac{v}{c}\right)=P_b \cdot \left|\vec{B}\right|^2 \text{ for magnetic fields ,} \qquad (7)$$

with P_e and P_b being factors of proportionality.

If we dissolve these equations to the speed of propagation v, we can derive the reduction of the length of a given wave-packet and furthermore the reduction of its speed of propagation, while it is running through an alternating field strength, as it is illustrated in figure 9:

$$(6) \quad \Rightarrow \quad v_1 = c \cdot \left(1-P_e \cdot \left|\vec{E}\right|^2\right) \text{ and } \quad \Rightarrow \quad v_2 = c \cdot \left(1-P_e \cdot \left|\vec{E}\right|^2\right) \text{ for electric fields,} \qquad (8)$$

$$(7) \quad \Rightarrow \quad v_1 = c \cdot \left(1-P_b \cdot \left|\vec{B}\right|^2\right) \text{ and } \quad \Rightarrow \quad v_2 = c \cdot \left(1-P_b \cdot \left|\vec{B}\right|^2\right) \text{ for magnetic fields.} \qquad (9)$$

If we put v for a given duration of propagation into this relation, we derive

$$v=\frac{\Delta s}{\Delta t} \Rightarrow \Delta t=\frac{\Delta s}{v}=const. \Rightarrow \frac{\Delta s_1}{v_1}=\frac{\Delta s_2}{v_2} \Rightarrow \frac{v_1}{v_2}=\frac{\Delta s_1}{\Delta s_2}=\frac{L_1}{L_2} \Rightarrow L_2=L_1 \cdot \frac{1-P_e \cdot \left|\vec{E}_2\right|^2}{1-P_e \cdot \left|\vec{E}_1\right|^2} , \qquad (10)$$

resp. for magnetic fields $L_2=L_1 \cdot \dfrac{1-P_b \cdot \left|\vec{B}_2\right|^2}{1-P_b \cdot \left|\vec{B}_1\right|^2} .$ \qquad (11)

The factor between L_1 and L_2 is the factor, by which the length of the wave-package is altered because of its way through varying field-strength.
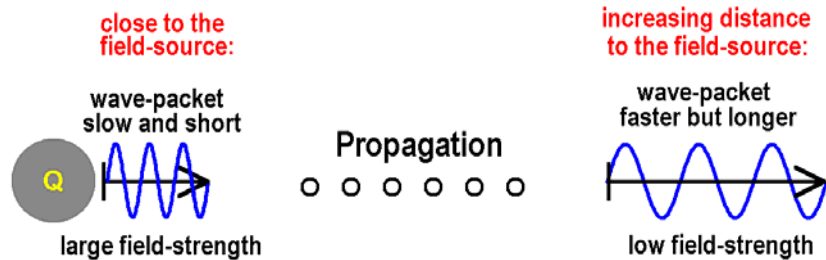

Fig. 9:
Illustration of the propagation of the wave-packets of the zero-point-waves through zones of varying field strength.

This consideration corresponds to the fact, that the zero-point wave-packets adjust their compression or prolongation as well as their speed of propagation to the requirements of the field strength which they pass, according to figure 3 and figure 4.

5. Converted machine power

Of course we want to dedicate our attention to the question, how much zero-point energy is converted per time. This means, we want to find out the converted machine-power. Indeed, this question makes sense only if the system-parameters are adjusted as done in figure 6, because under this operation, the machine is a zero-point energy converter.

Power can only be extracted from a motor, if there is some (mechanical) resistor, and not as long as it is running without any force. This makes it necessary to introduce an additional force into our DFEM-algorithm, for instance a force of friction. In order to keep the comprehensibility of our calculation-example as easy as possible, let us decide to introduce dry friction, which is independent from the relative speed of the motion, as it known as Coulomb's friction. This allows us to introduce a force F_R, which is defined in the third part of the algorithm with the name "Reib". This force is switched on at the time of 10 seconds, and from there on it remains constant until to the end of the computation at time of 100 seconds. This is also the time interval over which the machine-power is determined as the average of the absolute value of the machine power (even if the graphic-plot is continued only to the time of few more than 65 seconds).

For the purpose of supervision, we begin with a force of $F_R = 0$, and we identically reproduce the behaviour, which we already know from figure 6 with an enhancement of the amplitude of 3.20 meters. Please compare this result of figure 10.

After this verification of the algorithm, we now decide to enhance the force of friction step-by-step, and to our surprise, we detect that the enhancement of the amplitude does <u>not</u> decrease with increasing friction. We find out that an enhancement of the energy being extracted by friction, enhances the amplitude of the oscillation. Friction does not reduce the speed of the motion, but it additionally empowers it !

The finding is the following: When we extract energy from the oscillating system, the amplitude is a little bit larger, compared to the system without energy-output (see blue curve in figure 10). This indicates the following: When we try to slow down the motion, we optimize the adjustment of the phase-difference between the bodies and the fields in such a way, that the extraction of zero-point energy from the quantum vacuum is increasing. This is the reason, why we see a linear growth of the purple curve, representing the machine-power as a function of the force of friction, in figure 10. This indicates, that it should be possible by principle, to maximize the amount of energy being extracted from the quantum vacuum, by doing a search of the maximum of the purple curve in figure 10.

This finding is confirmed by the reports of several vacuum-energy experimentalists. Although they built their engines from intuition (and not on the basis of an existing theory), they observe this phenomenon several times. And sometimes this observation is dangerous for these experimentalists, because their engines suddenly begin to run too fast, so that they lose the control over the engines. Some of them report, that they tried to slow down their engines by using a strong break (enhancing friction very much), and they have been astonished that this extraction of kinetic energy from their apparatus did not reduce its speed. There are even reports, according to which vacuum-energy motors began to run so fast, that the they burst into pieces (one of them is [Har 10]). From our theoretical calculations now we fully understand the reason for this problem: It is just the fact, that the phase-difference between the field's propagation and the motion of the components of the zero-point engine can be optimized by friction.

Every practical experimentalist will express the objection: Very strong and rigid friction can bring every motion to standstill. Certainly this is true. As we see in figure 10, there is a critical

value for the friction, at which the power-conversion more or less suddenly collapses and the amplitude of the oscillation goes to zero. Obviously the effect of friction is so strong at this point, that the moving components of the engine can not follow the speed of propagation of the fields any further. This means that the moving components of the engine and the moving fields can not keep the phase-difference necessary for resonant excitation of the engine any further.

If we apply a "zoom" to this part of figure 10 with $F_R = 0.334 \ldots 0.344\,N$, we come to figure 11. There we can see, that there is a certain interval, during which the phase-difference for resonance is being lost. This means, that the zone of maximum power-extraction from the quantum vacuum has some certain width. If a zero-point-energy motor can be operated within this range, friction will be just a little bit too weak to stop the engine.
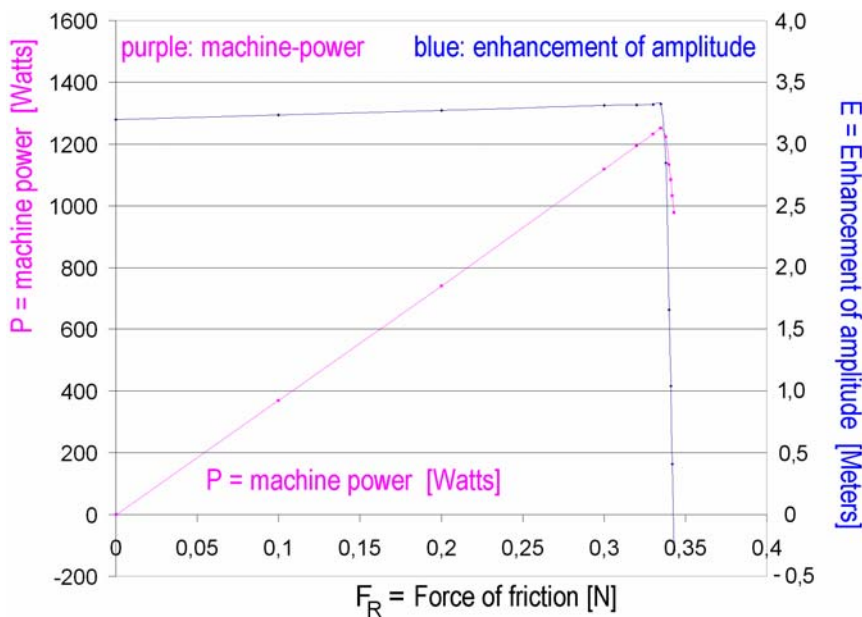

Abb. 10:

Enhancement of the amplitude (blue curve and blue scale at the right ordinate) and the converted power (purple curve and purple scale at the left ordinate) of a zero-point energy motor as a function of the converted energy (here represented as friction).
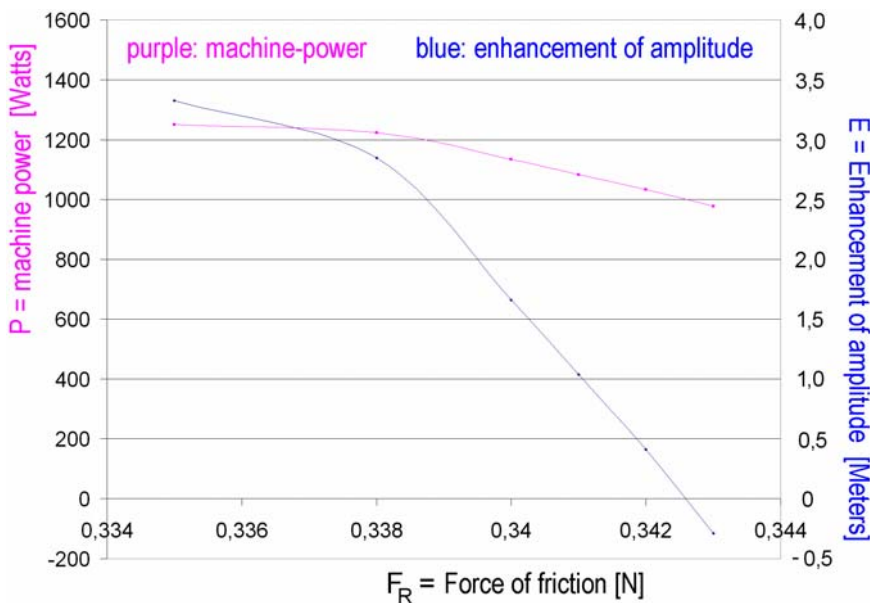

Abb. 11:

„Zoom" to Fig.10 at the range of the power-maximum of a zero-point-energy motor.

By the way, a negative enhancement of the amplitude (blue curve below zero) is understandable very easy. It indicates, that there friction is so strong, that the amplitude is reduced

in comparison to its value at the beginning of the oscillation. If we would continue our DFEM-simulation to a longer time interval, the engine would come to standstill under this operation. Under practical operation is necessary, to drive the machine in a way, that the amplitude will be kept constant over long time interval. This should not be difficult, if the extraction of energy (and power) is kept on the left side apart from the maximum of the purple curve.

References

[Ber 71] Bergmann-Schaefer, Lehrbuch der Experimentalphysik
          H.Gobrecht, Verlag Walter de Gruyter, 1971, ISBN 3-11-002090-0

[Boe 07] Exploring the QED vacuum with laser interferometers
          Daniël Boer und Jan-Willem van Holten, arXiv:hep-ph/0204207v1,
          verschiedene Versionen von 17. April 2002 bis 1. Feb. 2008

[Bor 99] Borland Pascal (Delphi 5 aus 1999 oder neuere Version)

[Har 10] Example by Guy Hary at the Congress „Autonome Energiesysteme", 3.-5.Sept.2010
          at Schloss Hofen, Lochau near Bregenz: Schweizerische Vereinigung für
          Raumenergie SVR, Jupiter-Verlag/TransAltec AG, Zürich

[Hei 36] Folgerungen aus der Diracschen Theorie des Positrons
          W. Heisenberg und H. Euler, 22.Dez.1935, Zeitschrift für Physik (1936), S.714

[Rik 00] Magnetoelectric birefringences of the quantum vacuum
          G. L. J. A. Rikken and C. Rizzo, 2000, Phys. Rev. A, Vol.63, 012107 (2000)

[Rik 03] Magnetoelectric anisotropy of the quantum vacuum
          G. L. J. A. Rikken and C. Rizzo, 2003, Phys. Rev. A, Vol.67, 015801 (2003)

[Tur 10] The fundamental Principle of the Conversion of Zero-point-energy of the Vacuum
          Claus W. Turtur, PHILICA.COM, ISSN 1751-3030, Article no.206, (28. Sept. 2009)

[Information]   An extended list of literature-references is to be found at [Tur 10].

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